

Serial No.: 10/531,810

Examiner: Muhammad N. Edun

Title: INFORMATION RECORDING MEDIUM, INFORMATION RECORDING APPARATUS AND INFORMATION REPRODUCING APPARATUS FOR THE SAME

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DEC 21 2006**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listing, of claims in the application.

1. (Currently amended) An information recording medium in which a recording mark is formed as main information by switching a signal level at a predetermined interval of a reference signal,
wherein sub-information is recorded so as to be superimposed on the main information by deformation of a shape or a pattern of the recording mark or positional displacement of the recording mark in accordance with the sub-information, the sub-information being subjected to data conversion based on ~~medium inherent information or~~ apparatus nullification information that ~~is~~ has been recorded in advance on the information recording medium.
2. (Currently amended) The information recording medium according to claim 1,
wherein ~~the medium inherent information is recorded irreversibly so that only reproduction can be performed with respect to the medium inherent information~~ the data conversion is data scrambling of the sub-information in accordance with a pseudo random number sequence that is generated using the apparatus nullification information as an initial value.
3. (Currently amended) The information recording medium according to claim 2,
wherein ~~the medium inherent information is recorded in a burst cutting area (BCA)~~ the data conversion further is data scrambling of the sub-information in accordance with a pseudo random number sequence that is generated using as an initial value medium inherent information of the information recording medium that has been recorded in advance on the information recording medium.
4. (Currently amended) The information recording medium according to claim 3
[[1]].

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wherein ~~the data conversion of in recording the sub-information is a correlation operation of the sub-information with respect to,~~ the sub-information is subjected to data scrambling in which ~~a the~~ pseudo random number sequence that is generated using the medium inherent information or the apparatus nullification information as an initial value and the pseudo random number sequence that is generated using the medium inherent information as an initial value are switched with respect to every predetermined recording unit that is any one of a frame unit including a synchronization code of the main information, a sector unit including address information, and a block unit encoded into an error-correction code.

5. (Currently amended) The information recording medium according to claim 1, wherein ~~the data conversion of the sub-information is a correlation operation of the sub-information with respect to is~~ data scrambling of the sub-information in accordance with a pseudo random number sequence that is generated using as an initial value ~~a contents an~~ an encryption key of the main information obtained using the ~~medium inherent information or the apparatus nullification information.~~

6. (Currently amended) The information recording medium according to claim 5, wherein ~~the apparatus nullification information is an encryption key set for encrypting the main information of the information recording medium~~ the encryption key is a medium inherent key obtained based on the apparatus nullification information and medium inherent information of the information recording medium that has been recorded in advance on the information recording medium.

7-12. (Canceled)

13. (New) The information recording medium according to claim 1, wherein the apparatus nullification information is an encryption key set for encrypting the main information of the information recording medium.

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14. (New) An information recording apparatus, comprising:
- a main information recording unit that records, in synchronization with a predetermined reference signal, main information by forming a recording mark at discrete reference positions on an information recording medium;
 - a data converting unit that subjects sub-information to data conversion based on apparatus nullification information that has been recorded in advance on the information recording medium; and
 - a sub-information recording unit that records the sub-information so that the sub-information is superimposed on the main information by deformation of a shape or a pattern of the recording mark or positional displacement of the recording mark, based on the sub-information subjected to the data conversion by the data converting unit.
15. (New) The information recording apparatus according to claim 14,
- wherein the data converting unit subjects the sub-information to data scrambling in accordance with a pseudo random number sequence that is generated using as an initial value an encryption key of the main information obtained using the apparatus nullification information.
16. (New) The information recording apparatus according to claim 15,
- wherein the encryption key of the main information is a medium inherent key obtained based on the apparatus nullification information and medium inherent information of the information recording medium that has been recorded in advance on the information recording medium.
17. (New) The information recording apparatus according to claim 14,
- wherein the data converting unit performs data scrambling of the sub-information in accordance with a pseudo random number sequence that is generated using the apparatus nullification information as an initial value.
18. (New) The information recording apparatus according to claim 17,

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wherein the data conversing unit further performs data scrambling of the sub-information in accordance with a pseudo random number sequence that is generated using as an initial value medium inherent information of the information recording medium that has been recorded in advance on the information recording medium.

19. (New) The information recording apparatus according to claim 18,

wherein the data converting unit subjects the sub-information to data scrambling in which the pseudo random number sequence that is generated using the apparatus nullification information as an initial value and the pseudo random number sequence that is generated using the medium inherent information as an initial value are switched with respect to every predetermined recording unit that is any one of a frame unit including a synchronization code of the main information, a sector unit including address information, and a block unit encoded into an error-correction code.

20. (New) An information reproducing apparatus, comprising:

a main information reproducing unit that reproduces main information from a recorded mark having a length that is an integral multiple of a discrete reference interval on an information recording medium;

a clock extracting unit that extracts a clock that is synchronized with the reference interval from a reproduced signal obtained when the recorded mark is reproduced;

a random number sequence generating unit that reads out apparatus nullification information that has been recorded in advance on the information recording medium and generates a pseudo random number sequence based on the apparatus nullification information; and

a sub-information reproducing unit that reproduces sub-information based on the reproduced signal reproduced by the main information reproducing unit, the clock extracted by the clock extracting unit, and the pseudo random number sequence generated by the random number sequence generating unit.

21. (New) The information reproducing apparatus according to claim 20,

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wherein the random number sequence generating unit generates the pseudo random number sequence using as an initial value an encryption key of the main information obtained using the apparatus nullification information.

22. (New) The information reproducing apparatus according to claim 21, wherein the encryption key of the main information is a medium inherent key obtained based on the apparatus nullification information and medium inherent information of the information recording medium that has been recorded in advance on the information recording medium.
23. (New) The information reproducing apparatus according to claim 20, wherein the random number sequence generating unit generates the pseudo random number sequence using the apparatus nullification information as an initial value.
24. (New) The information reproducing apparatus according to claim 23, wherein the random number sequence generating unit generates the pseudo random number sequence further using as an initial value medium inherent information of the information recording medium that has been recorded in advance on the information recording medium.
25. (New) The information reproducing apparatus according to claim 24, wherein the random number sequence generating unit switches between the pseudo random number sequence that is generated using the apparatus nullification information as an initial value and the pseudo random number sequence that is generated using the medium inherent information as an initial value with respect to every predetermined recording unit that is any one of a frame unit including a synchronization code of the main information, a sector unit including address information, and a block unit encoded into an error-correction code.